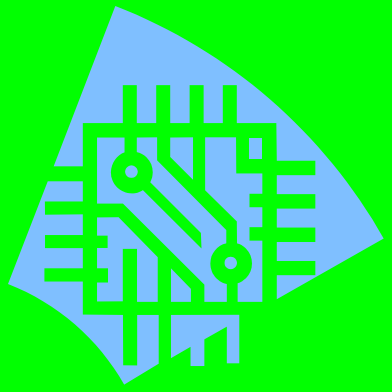
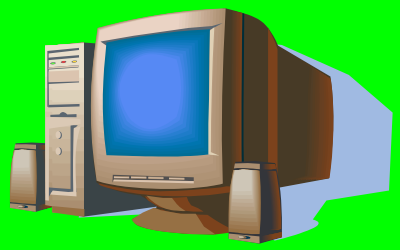


How To Delete Files

A Presentation By Archive Dive

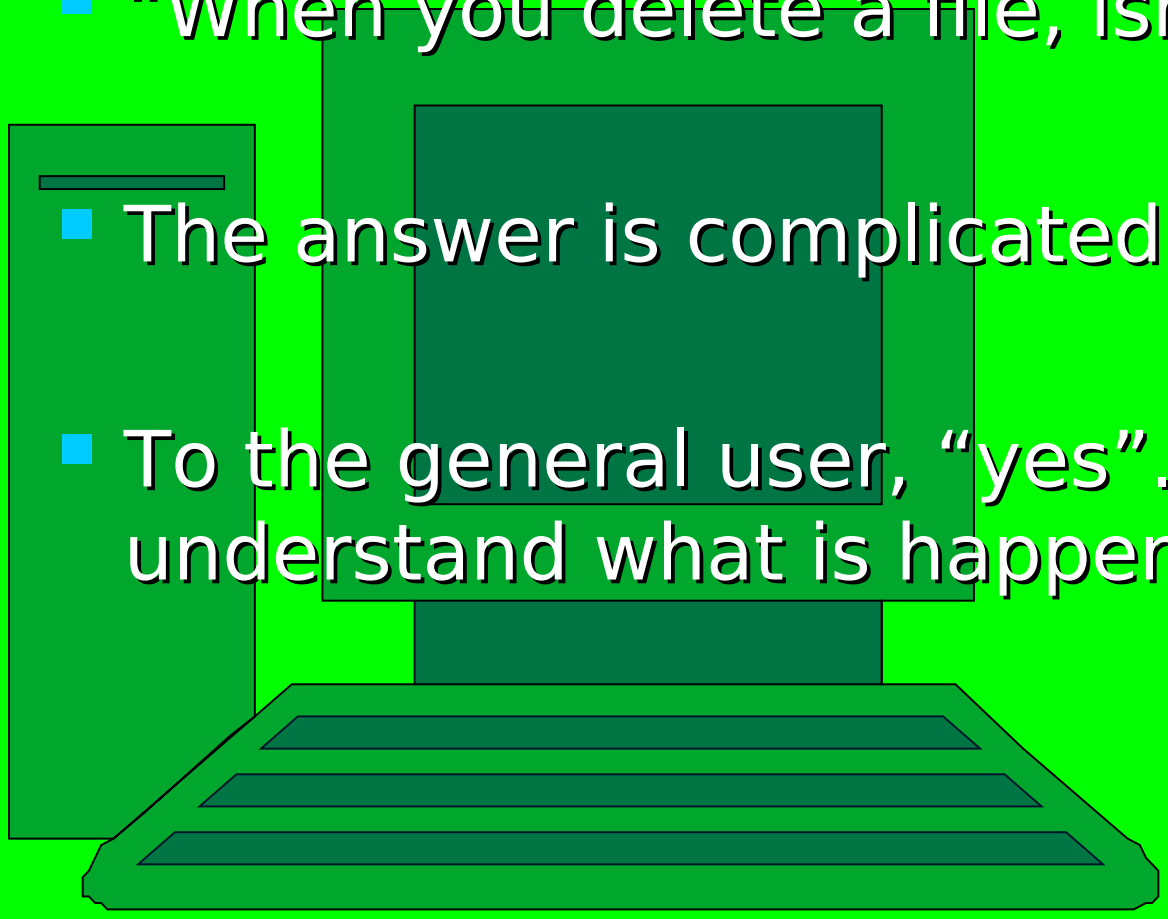


Introduction

- What happens when you delete a file
- How to recover deleted files
- How to make deleted files unrecoverable
- How to “wipe free space” to stop anybody finding leftover files
- How to securely wipe SSDs (and Flash storage) immediately

The Question I Get A Lot:

- “When you delete a file, isn’t it gone?”
- The answer is complicated, “yes and no”.
- To the general user, “yes”. To those who understand what is happening, “no”.



Warning

- This guide isn’t for bad people. If you’re hiding illegal activity, you will eventually be found out.
- This guide is for people who want to scrub their device clean before selling, donating or safely and legally disposing of it.
- No implied warranty, if you follow any of the steps in this video and manage to damage your stuff, I take no responsibility.

What Happens When You Delete A File?

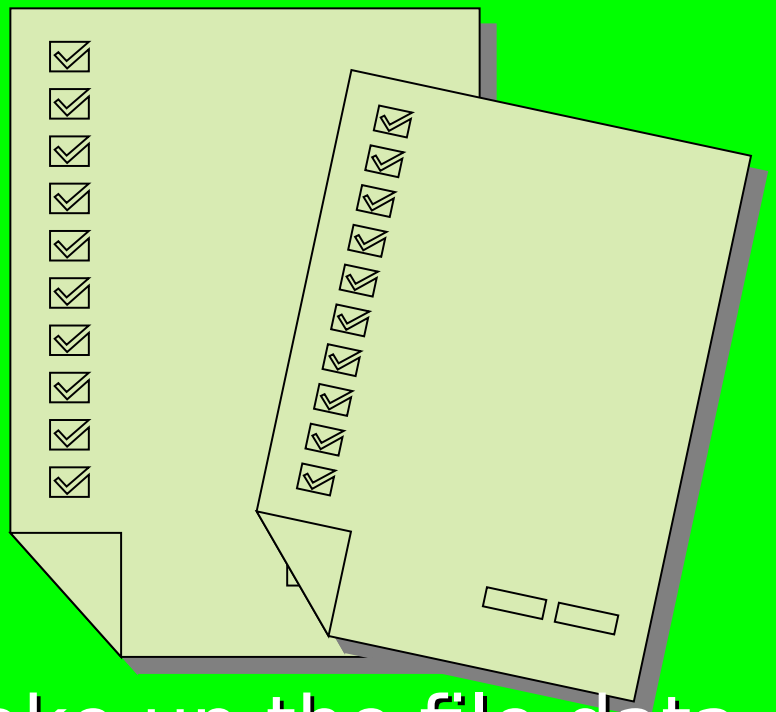
A Basic Understanding Of Your File System

File System (Simplified)

- MFT
  - Master File Table
  - This is where the records for files are stored, like name, location, size, date created, etc.
- Sectors
  - These are the physical sectors on your hard disk / storage medium
  - The number of these can never change, they are physical components of your device

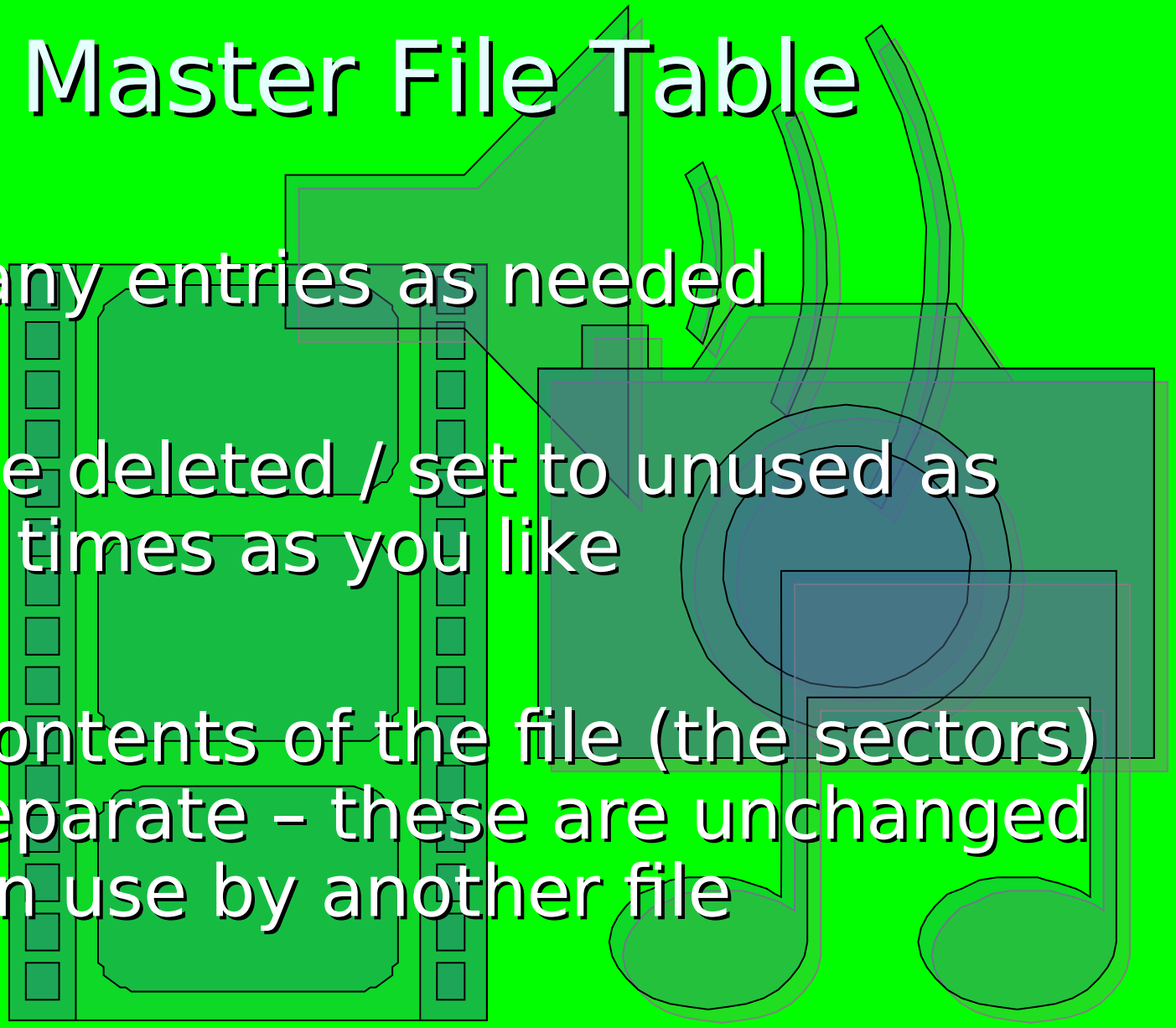
Master File Table

- File Name
- Location
- Size
- Metadata, etc.

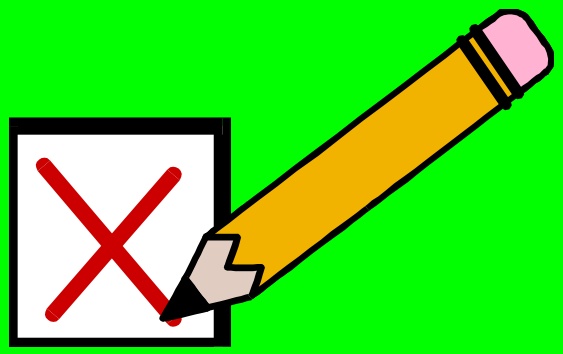


- Which sectors that make up the file data
- The record of the file (in use or unused)

Master File Table



- As many entries as needed
- Can be deleted / set to unused as many times as you like
- The contents of the file (the sectors) are separate – these are unchanged until in use by another file

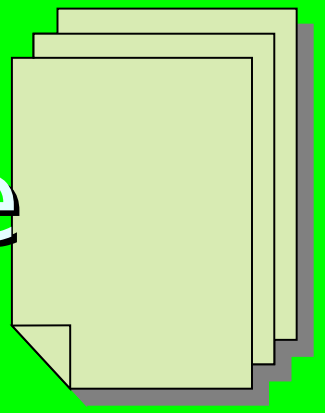


Recycle Bin

- This isn’t “deleting” a file, it’s sending it to another location, the data is completely unaffected.

- File is only “deleted” when Recycle Bin is emptied, or file is deleted on a drive where Recycle Bin isn’t in use, or with an alternative deletion method, such as the key combination Shift+Delete.

So You Deleted A File

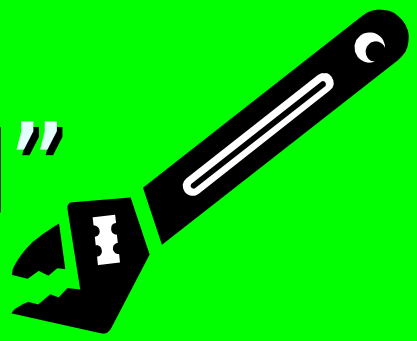


- When you create a new file, it may choose to overwrite the contents of the previous file, though unlikely.
- On a HDD, the location to where a new file is written is random (it could overwrite old sectors).
- On an SSD, the new file is written in NAND cells that have less wear, so it’s very unlikely you’ll overwrite the old file right away.

Why don’t we delete the contents?

- Bill Gates didn’t have the foresight that PCs today would be super powerful.
- PCs at the time – deleting file contents would take minutes or even hours – too slow!
- Modern storage (SSDs, USBs, SD cards) would suffer increased wear and die out faster if we deleted the contents right away.

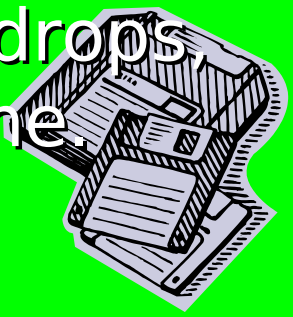
Okay WTF is “TRIM”



- TRIM is a process that runs on the chip/controller of your flash storage.
- It tells the device to write to parts of the storage that have experienced less wear.
- TRIM stops parts of your SSD from dying out quickly or becoming unusable.
- This has the knock-on effect of making data recovery more likely to succeed.

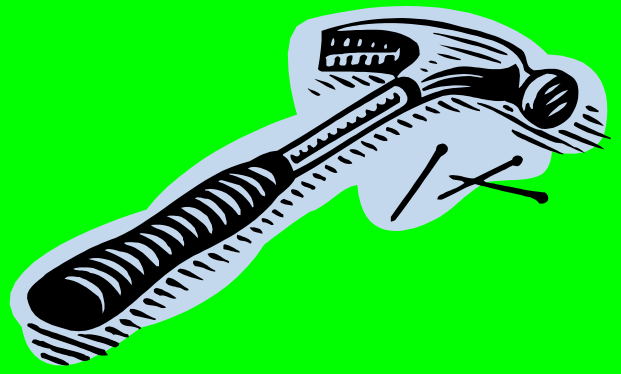
HDDs vs SSDs (& Flash)

- HDD sectors can be changed as often as you like without wear but device is slower.
- SSD sectors experience slight wear every time a sector is changed but the device is MUCH faster.
- HDDs are usually ruined from as much as a knock or drop – prone to physical failure.
- SSDs can typically survive knocks and drops, liquid damage, etc. But will die over time.



You want to delete a file for GOOD on an SSD?

More drastic measures are needed...



Recovering Data

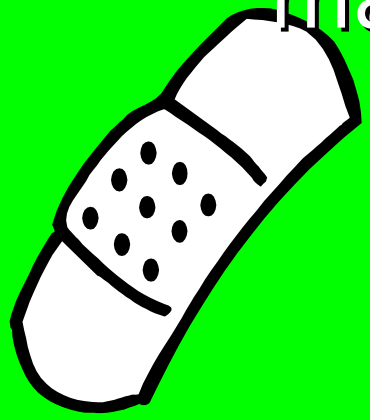
- Look at MFT, find the sectors NOT in use by any files, then examine THOSE sectors for known file type signatures.
- The process is not perfect, there is a lot of guesswork involved. Sometimes only small parts of files can be recovered.
- False positives and previously shredded files are common with larger drives.

Software For Data Recovery

- Recuva
  - Easy to use, free for personal use.
- Testdisk / QPhotoRec
  - Free to use, no warranty provided.
- HDDRawCopy
  - For complete drive copies sector by sector.
- Rescuezilla
  - Bootable environment from USB/CD.

Now you know how to RECOVER files…

…let’s look at how we can make them harder to recover!

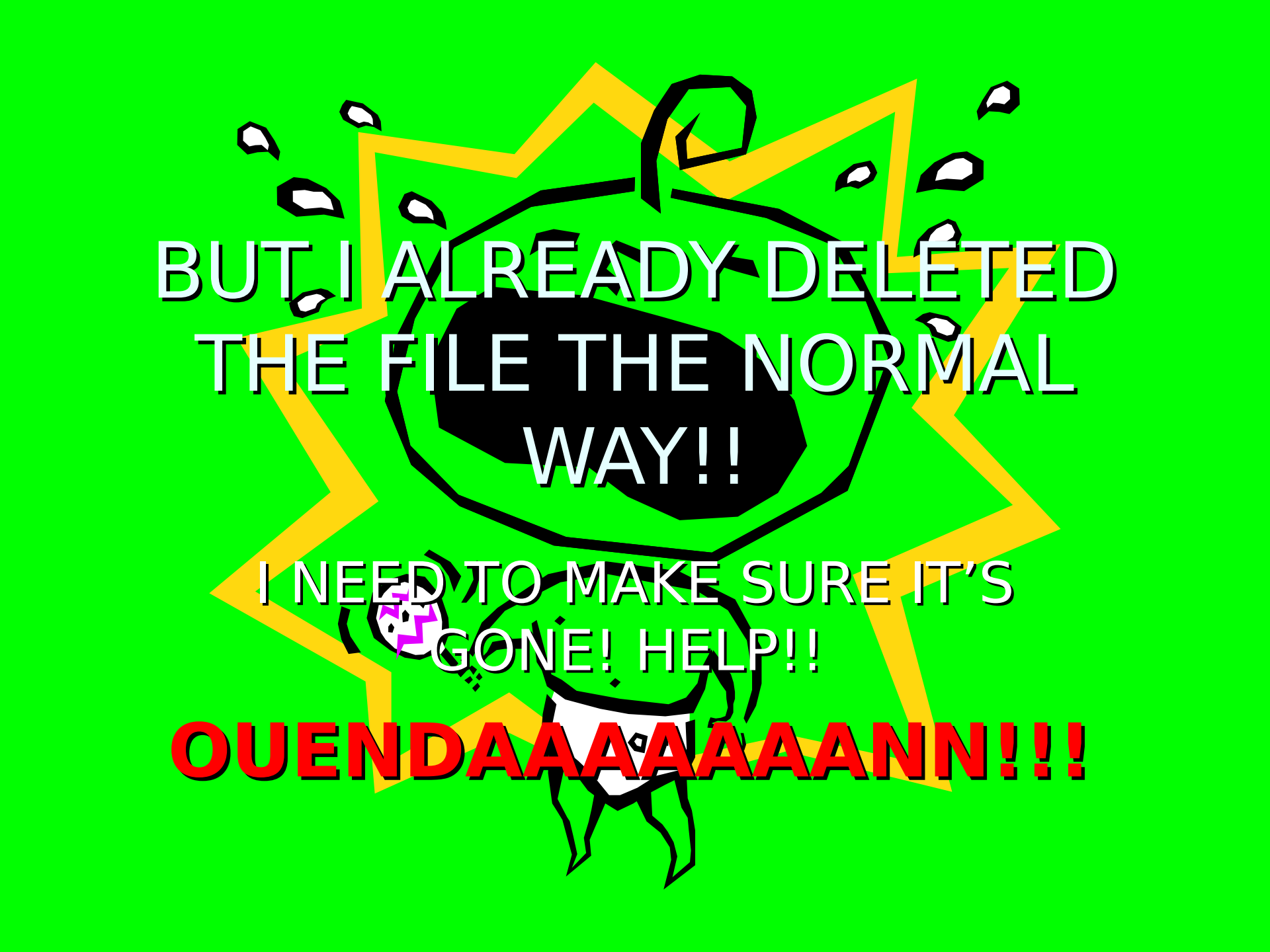


How to OVERWRITE a file...

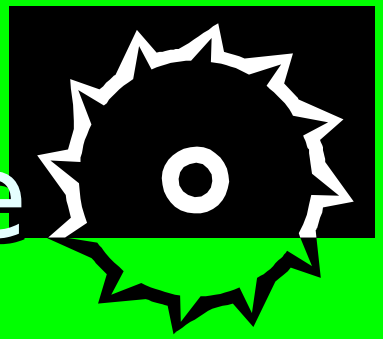
- Look at the file record in the MFT, see which sectors make up the file data, erase/jumble/overwrite THOSE, then delete the record of the file.
- Most software allows you to overwrite anywhere from 1 to 35 times, but based on my understanding even most worldwide security agencies use no more than 7 overwrites.

Software For Overwriting Files

- CCleaner
  - Free, but nags for updates, telemetry concerns.
- File Shredder
  - Free, a bit archaic but does the job!
- Bleachbit
  - Like CCleaner but highly customisable.
- RevoUninstaller
  - Gaining popularity, user-friendly GUI.


BUT I ALREADY DELETED THE FILE THE NORMAL WAY!!
I NEED TO MAKE SURE IT'S GONE! HELP!!
OUENDAAAAAAANN!!!

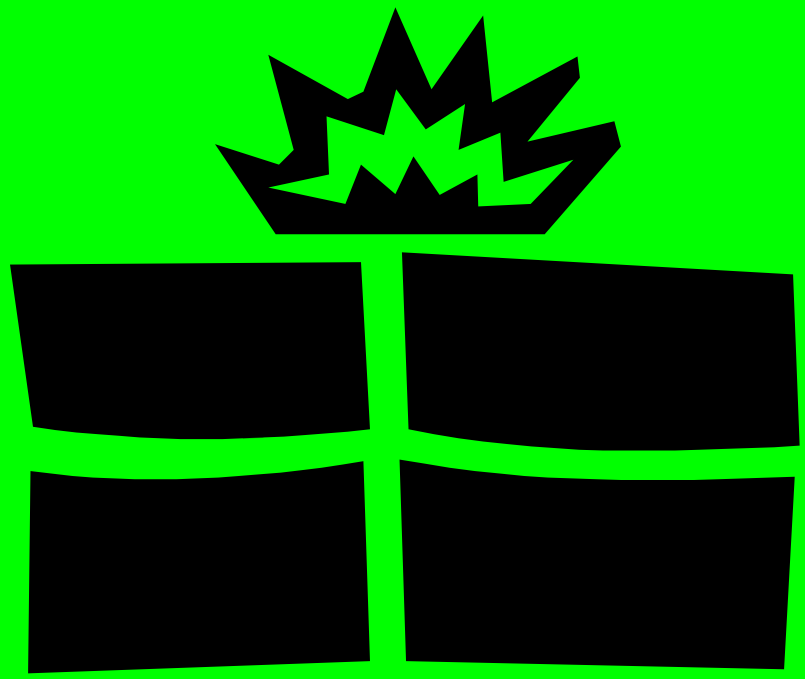
Wiping Free Space



- Checking the MFT for sectors not in use by files (like when recovering files), then deleting/overwriting those sectors.
- SLOW.
- Great for HDDs, burial of old contents all but guaranteed!
- Heavy wear on SSDs and Flash storage, reducing their life considerably.

Software To Wipe Free Space

- CCleaner
- BleachBit
- RevoUninstaller
- File Shredder



- Recuva
  - Select or highlight a recoverable file, select Secure Overwrite.

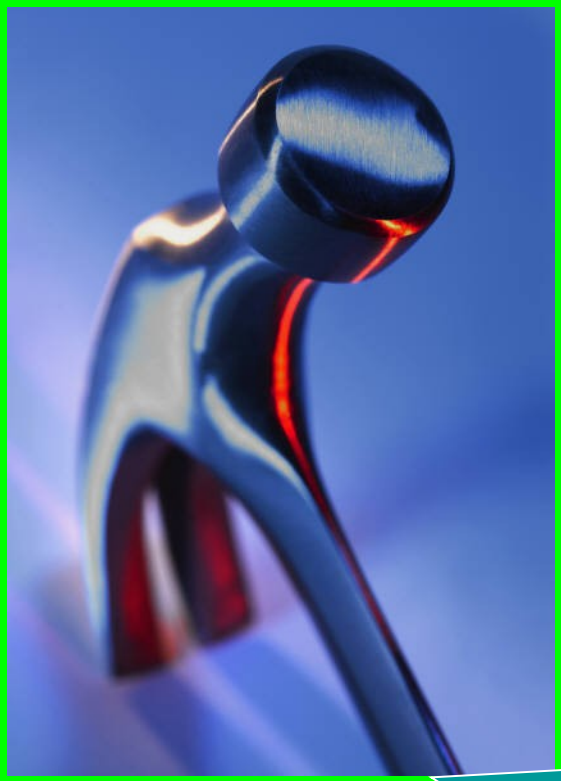
Overwriting and shredding on SSDs kills them quickly?

"There must be a simpler way!"™

Overwriting on SSDs

- Option #1 – I don’t care about the health of the drive, shred the files anyway. (Valid option, but hurts drive long term.)
- Option #2 – DBAN (Darik’s Boot And Nuke).
- Option #3 – ATA Secure Erase (located in either your BIOS or UEFI tools).
- Option #4 – Cryptographic Erase

OPTION #5



BANG!!!!!

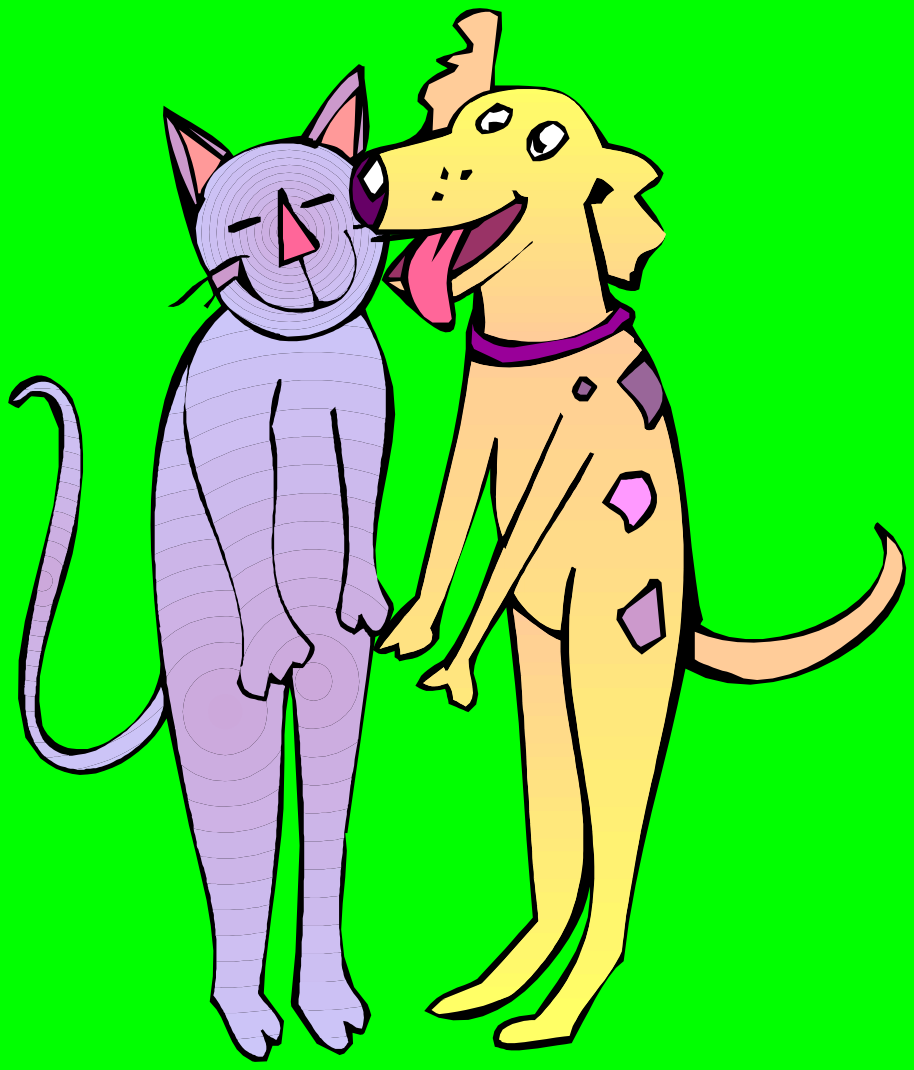
If you take just ONE thing away with you today…

TAKE YOUR DATA SECURITY SERIOUSLY!!

Recap

- To ensure data is gone forever, destroy drive.
- Otherwise – secure overwrite no more than 7 times.
- Or, wipe the drive from BIOS/UEFI tools, or DBAN the drive.
- Keep your private data safe, especially if you plan to sell, donate or dispose of drives.

Any Questions?



Now you know how to delete files...

...don’t end up like this guy!